IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re National Phase of:

Applicant:	Andreas Blumhofer et al.
Application No.:	09/955,470
Filing Date:	September 18, 2001
Title:	METHOD AND DEVICE FOR ACCURATELY POSITIONING A PATIENT IN RADIOTHERAPY AND RADIOSURGERY
Attorney Docket No.	SCHWP0147US

PRELIMINARY AMENDMENT DELETING MULTIPLE DEPENDENCIES

Commissioner for Patents
United States Patent and Trademark Office
Washington, DC 20231

Sir:

Please amend the application in accordance with the following appended parts:
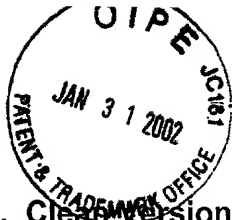
A.   Clean Version of Replacement Paragraph/Section/Claim with Instructions for Entry; and

B.   Version with Markings to Show Changes Made.

Remarks

By way of the foregoing, all of the claims have been amended to delete multiple dependencies. In the event there still remains a claim that depends from more than one claim, the Office is hereby authorized to amend such claim to depend from the first mentioned of the multiple claims from which it depends.

Respectfully submitted,

Don W. Bulson, Reg. No. 28,192
RENNER, OTTO, BOISSELLE & SKLAR, LLP
1621 Euclid Avenue - Nineteenth Floor
Cleveland, Ohio 44115
(216) 621-1113

A. Clean Version of Replacement Paragraph/Section/Claim with Instructions for Entry

Please amend the application as follows:

<u>In the Claims:</u>

Please substitute the following claims for the pending claims of corresponding number.

4.   The method as set forth in claim 1, wherein the x-ray images are produced at an oblique angle on an image recorder spatially arranged horizontally, and projected back onto each respectively defined normal plane, the corresponding reconstructed images being likewise produced in these normal planes.

5.   The method as set forth in claim 1, wherein the patient is pre-positioned by means of a navigation and tracking system with computer and camera guidance, with the aid of artificial, in particular reflecting, arrangements of markers on the patient and on the devices for treatment.

6.   The method as set forth in claim 1, wherein the patient is pre-positioned using markings on the patient's skin, natural landmarks or laser markings.

7.   The method as set forth in claim 1, wherein the x-ray images and the reconstructed images are superimposed by way of natural structures present in the x-ray images and the reconstructed images, in particular bone structures.

8.   The method as set forth in claim 1, wherein the x-ray images and the reconstructed images are superimposed by way of artificial structures present in the x-ray images and the reconstructed images, in particular implanted markers, preferably gold spheres.

9.   The method as set forth in claim 7, wherein the x-ray images and the reconstructed images are superimposed by marking them manually and sliding them over one another on a computer display unit.

10. The method as set forth in claim 7, wherein the x-ray images and the reconstructed images are superimposed by automatic, computer-guided image fusion.

11. The method as set forth in claim 1, wherein the reconstructed image/s is/are produced as:

- Digitally Reconstructed Radiographs (DRRs);
- Digitally Composited Radiographs (DCRs);
- MIP images,

or as any two-dimensional image reconstruction from a three-dimensional patient scan data set.

12. The method as set forth in claim 1, wherein the position of the patient is altered by shifting the patient table, in particular being automatically guided and corrected by a navigation and tracking system with computer and camera guidance, using markers on the patient and on the patient table.

13. The method as set forth in claim 1, wherein the position of the patient is corrected by manually guiding the table.

14. The method as set forth in claim 1, wherein a multitude of images over a breathing cycle are produced from each angle, each time x-ray image are produced from the different recording angles, the breath-dependent movement of the markings arranged on the patient or in the vicinity of the radiation target being tracked by a navigation and tracking system with computer and camera guidance and referenced with the dynamic shifting of the target point directly or indirectly (e.g. via implanted markers) visible in the images, in order to take into account the breath-dependent shifting of the target point during irradiation.

17. The device as set forth in claim 15, characterised in that the image recorder (6) is positioned on a support (5) for a movable patient table (4).

19.   The device as set forth in claim 15, characterised in that the two x-ray sources (2, 3) are arranged respectively over a patient table (4), in particular fixed to the ceiling, and to the side.

20.   The device as set forth in claim 15, characterised in that the two x-ray sources (2, 3) are arranged respectively beneath a patient table (4), and to the side, the image recorder being positioned above the patient table (4).

B. Version with Markings to Show Changes Made

Please amend the application as follows:

In the Claims:

4.   (Amended) The method as set forth in [any one of claims 1 to 3] claim 1, wherein the x-ray images are produced at an oblique angle on an image recorder spatially arranged horizontally, and projected back onto each respectively defined normal plane, the corresponding reconstructed images being likewise produced in these normal planes.

5.   (Amended) The method as set forth in [any one of claims 1 to 4] claim 1, wherein the patient is pre-positioned by means of a navigation and tracking system with computer and camera guidance, with the aid of artificial, in particular reflecting, arrangements of markers on the patient and on the devices for treatment.

6.   (Amended) The method as set forth in [any one of claims 1 to 5] claim 1, wherein the patient is pre-positioned using markings on the patient's skin, natural landmarks or laser markings.

7.   (Amended) The method as set forth in [any one of claims 1 to 6] claim 1, wherein the x-ray images and the reconstructed images are superimposed by way of natural structures present in the x-ray images and the reconstructed images, in particular bone structures.

8.   (Amended) The method as set forth in [any one of claims 1 to 6] claim 1, wherein the x-ray images and the reconstructed images are superimposed by way of artificial structures present in the x-ray images and the reconstructed images, in particular implanted markers, preferably gold spheres.

9.   (Amended) The method as set forth in claim 7 [or 8] , wherein the x-ray images and the reconstructed images are superimposed by marking them manually and sliding them over one another on a computer display unit.

10.   (Amended) The method as set forth in claim 7 [or 8], wherein the x-ray images and the reconstructed images are superimposed by automatic, computer-guided image fusion.

11.   (Amended) The method as set forth in [any one of claims 1 to 10] claim 1, wherein the reconstructed image/s is/are produced as:

-   Digitally Reconstructed Radiographs (DRRs);
-   Digitally Composited Radiographs (DCRs);
-   MIP images,

or as any two-dimensional image reconstruction from a three-dimensional patient scan data set.

12.   (Amended) The method as set forth in [any one of claims 1 to 11] claim 1, wherein the position of the patient is altered by shifting the patient table, in particular being automatically guided and corrected by a navigation and tracking system with computer and camera guidance, using markers on the patient and on the patient table.

13.   (Amended) The method as set forth in [any one of claims 1 to 12] claim 1, wherein the position of the patient is corrected by manually guiding the table.

14.   (Amended) The method as set forth in [any one of claims 1 to 13] claim 1, wherein a multitude of images over a breathing cycle are produced from each angle, each time x-ray image are produced from the different recording angles, the breath-dependent movement of the markings arranged on the patient or in the vicinity of the radiation target being tracked by a navigation and tracking system with computer and camera guidance and referenced with the dynamic shifting of the target point directly or indirectly (e.g. via implanted markers) visible in the images, in order to take into account the breath-dependent shifting of the target point during irradiation.

17.   (Amended) The device as set forth in claim 15 [or 16], characterised in that the image recorder (6) is positioned on a support (5) for a movable patient table (4).

19.   (Amended) The device as set forth in [any one of claims 15 to 18] claim 15, characterised in that the two x-ray sources (2, 3) are arranged respectively over a patient table (4), in particular fixed to the ceiling, and to the side.

20.   (Amended) The device as set forth in [any one of claims 15 to 18] claim 15, characterised in that the two x-ray sources (2, 3) are arranged respectively beneath a patient table (4), and to the side, the image recorder being positioned above the patient table (4).